Engineering

IMPLEMENTATION OF A CROSSBAR NETWORK USING QUANTUM-DOT CELLULAR AUTOMATA

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We will present a novel method for the implementation of wire-crossing networks using quantum-dot cellular automata (QCA) cells. Such wire-crossing networks, also called crossbar networks, are an important part of modern programmable logic devices, such as programmable arrays of logic (PALs).

The crossbar networks are made possible through the use of parallel-to-serial converters and special regions with latching signals that are selected to sample and hold a particular value of serial data at a selected time. The particular signal connections made within the crossbar network are determined solely by the timing of the special latching signals rather than through physical changes to the device, so the same physical structure can be dynamically re-programmed to provide a variety of different interconnection functions at different times.

This wire-crossing network does not suffer from the shortcomings of the previously demonstrated QCA wire-crossing method, which required the use of rotated cells located on an interstitial cell spacing grid. This device only uses cells with a standard orientation on a regularly spaced grid.